NASA TECH BRIEF

Detection and Location of Metal Fragments in the Human Body

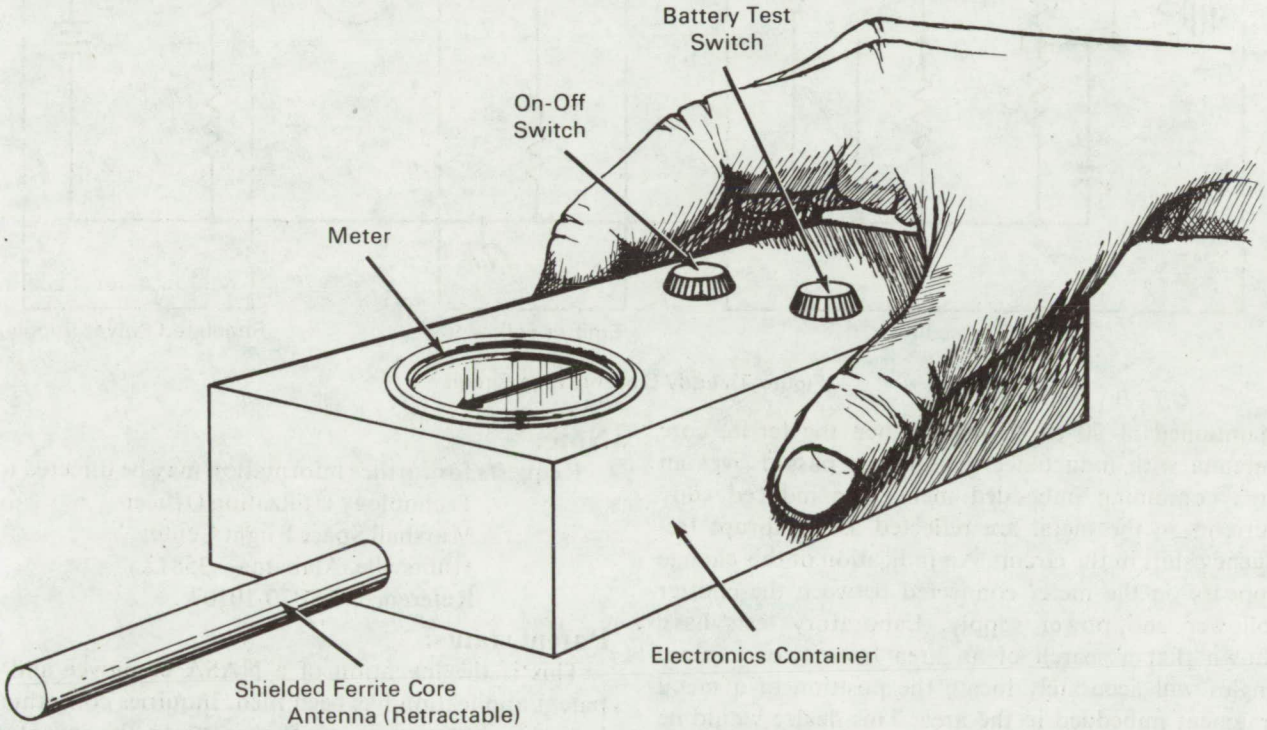

Figure 1. Conceptual Metal Fragment Detector

A small, portable electronic device (Figure 1), based on the design of an eddy current gage used for measuring the thickness of foam insulation on a metal surface, has been proposed as a rapid and safe means for detecting and locating nonferrous as well as ferrous metal fragments (or larger objects) accidentally introduced into the human body. Present X-ray methods are relatively cumbersome and slow and present a radiation hazard. In addition, the X-ray equipment is generally at an appreciable distance from the accident site. It is believed that the proposed device would be of emergency value to doctors in war zones and at accident sites and to surgeons in hospital operating rooms.

The circuit diagram (Figure 2) is of an early model of the eddy current gage developed for measuring the thickness of foam insulation. A specially designed oscillator circuit is supplied regulated power from a battery. To minimize the generation of eddy currents in the human body itself, the oscillation frequency would be

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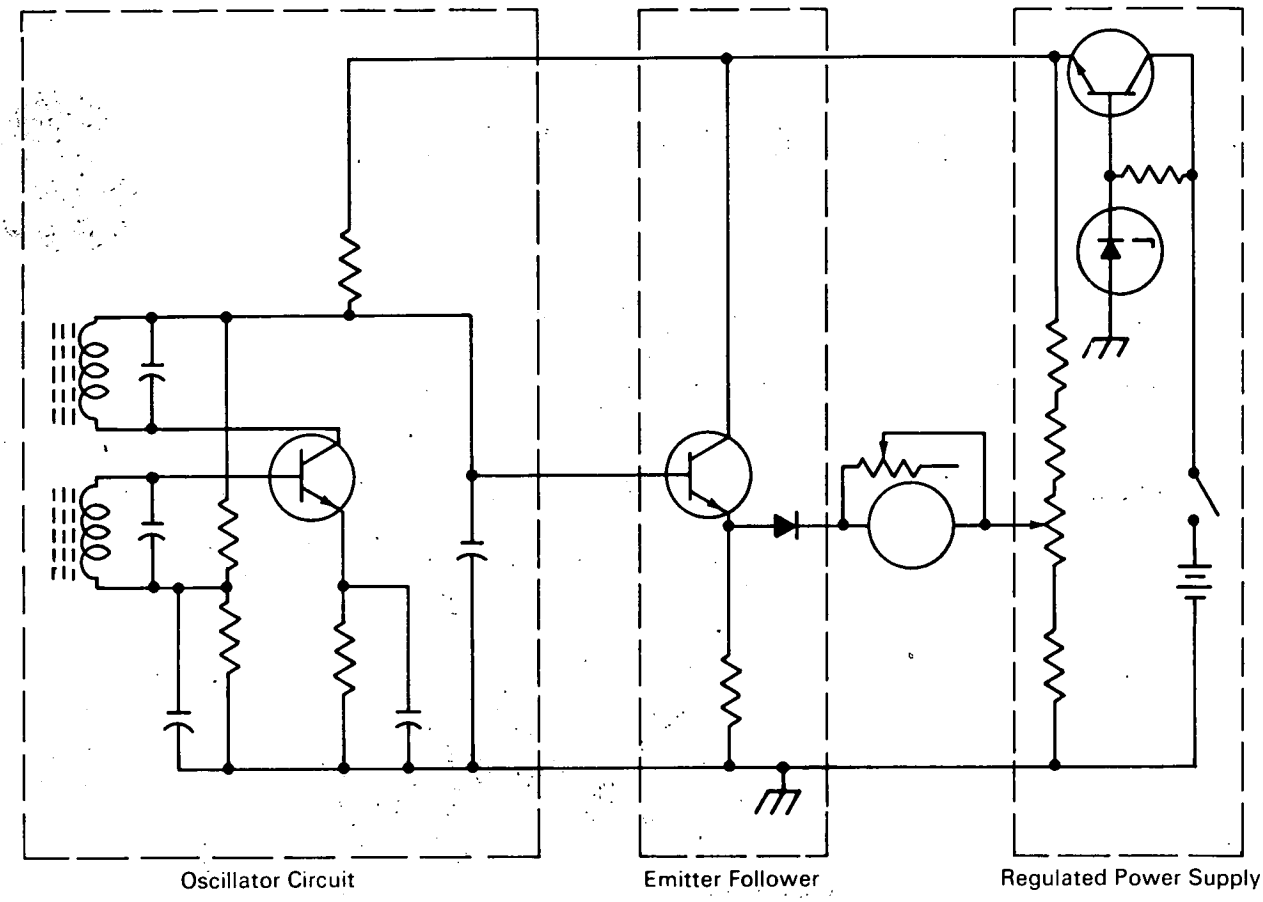

Figure 2. Eddy Current Gage Circuit

maintained at 20 to 40 kHz. When the ferrite core antenna with inductance windings is passed over an area containing imbedded metal, the induced eddy currents in the metal are reflected as an abrupt frequency shift in the circuit. An indication of this change appears on the meter connected between the emitter follower and power supply. Laboratory tests have shown that a search of an area from two or more angles will accurately locate the position of a metal fragment imbedded in the area. This device would be capable of detecting a 22-caliber bullet at distances up to 1 ft within a 0.5-in.-diam circle. The electronic circuitry and retractable antenna could be packaged into a container having a volume of approximately 60 cu in. and weighing approximately 2 lb.

Note:

Requests for further information may be directed to:

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Reference: TSP70-10107

Patent status:

This is the invention of a NASA employee and a patent application has been filed. Inquiries concerning license rights may be made directly to the inventor, Mr. R. L. Brown, at Marshall Space Flight Center.

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